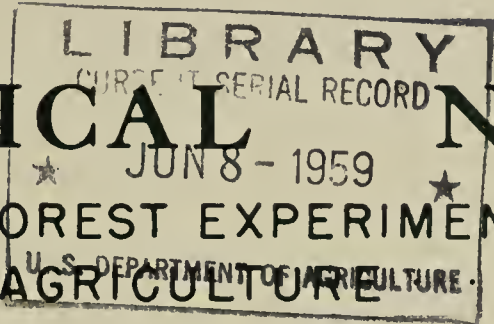


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# TECHNICAL NOTES

LAKE STATES FOREST EXPERIMENT STATION  
U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE

No. 556

## Trampling by Livestock Drastically Reduces Infiltration Rate of Soil in Oak and Pine Woods in Southwestern Wisconsin

Undisturbed forest soils, because of their high porosity, comparatively low bulk density, and rather deep surface organic layers, have an inherently high rate of infiltration.

This fact provides one of the most potent arguments for keeping steeper land in forest cover. However, when such forest land is subjected to trampling by livestock turned into the woods to graze, the infiltration rate of the soil is drastically reduced.

To obtain a measure of the relative reduction of infiltration rate due to intensive livestock use of the forests, a series of 48 infiltration tests were made. Steel cylinders 3 inches in diameter and 6 inches high were used. Twelve tests were made in each of four sites in the unglaciated region around La Crosse, Wis. Two sites were in native oak woods of sawlog size on loessal silt loam soil. Two others were in a Scotch pine plantation about 55 years old on a sandy loam soil. The cylinders were driven into the soil about 2 inches and then kept filled with water, with readings taken at 5, 10, 20, 30, 40, 50, 60, and 70 minutes thereafter. The infiltration rate for a 1-hour period excluding the first 10-minute wetting period is given below:

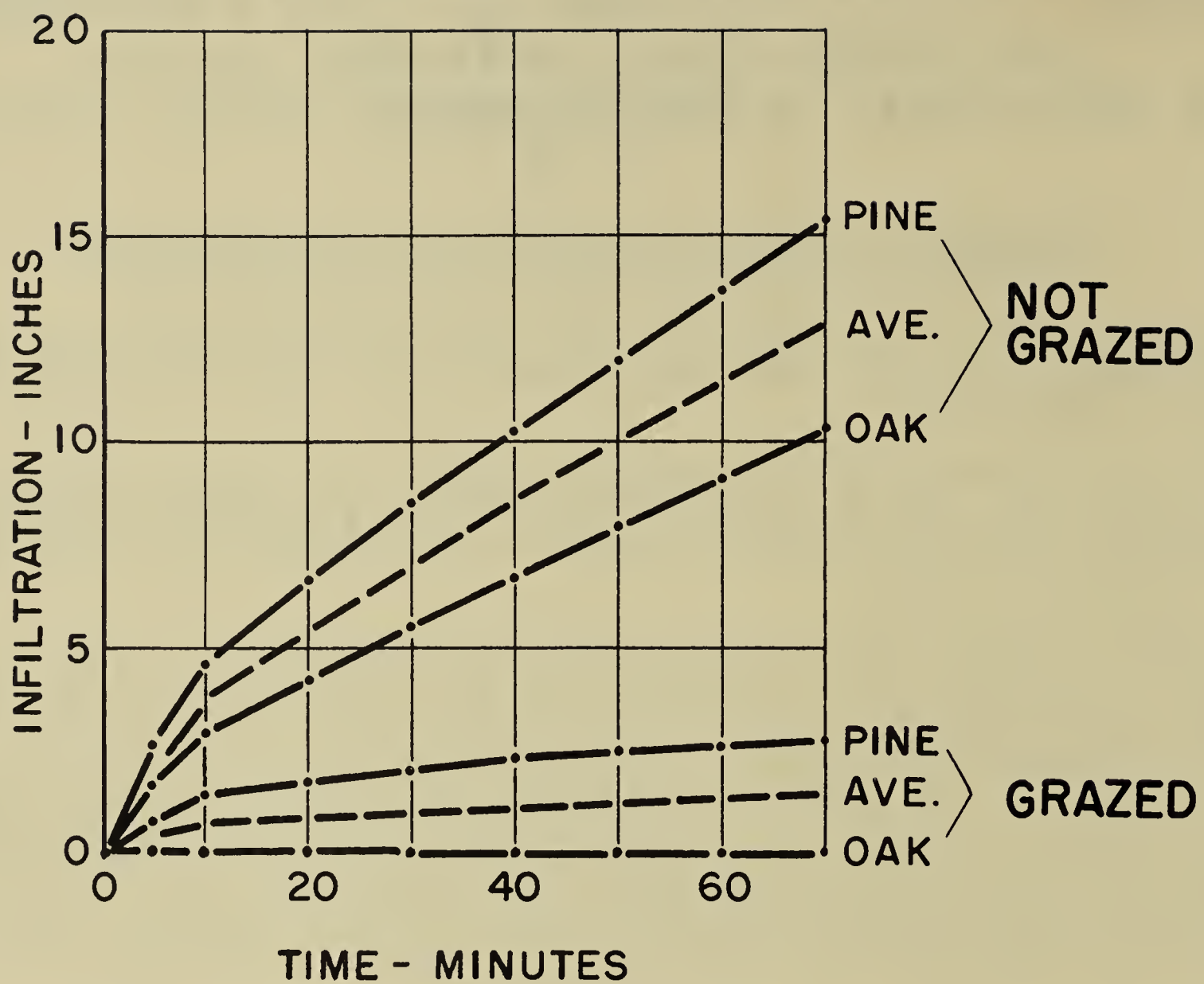
<u>Cover</u>	<u>Infiltration in inches per hour</u>
Ungrazed native oak woods	7.46
Grazed native oak woods	.05
Ungrazed Scotch pine plantation	11.02
Grazed Scotch pine plantation	1.23

Combining results of both areas, there is a 93-percent reduction in the cylinder infiltration rate due to livestock trampling. Statistical analysis of the data by "t" test showed the differences between grazed and ungrazed values to be significant at the 1-percent level. Since the native oaks and pines grew on different textured soils with inherently different infiltration rates, direct comparisons between the two cover types should not be made. The reduction within each cover as a result of trampling is valid, however. The comparative infiltration rates for all readings are shown graphically on the back of this sheet.

The bulk density (apparent specific gravity) of the surface 3 inches of soil in the oak woods was 1.15 and 0.89 respectively for grazed and ungrazed conditions, representing a 29.2-percent increase in density of the soil due to compaction.

April 1959

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Deleterious effect of cattle trampling on water infiltration into soil in two types of forest cover, Sept. 25-27, near La Crosse, Wis. Rates were measured in 3-inch cylinders.